Tornado frequency per unit area. (In U. S. Weather Bureau. MONTHLY WEATHER REVIEW, v. 25, p. 250–251. Washington, June, 1897.)

Property loss by tornadoes during the period 1889–1897. (In U. S. Weather Bureau. Report of the Chief, 1897–98, p. 304.)

Annual Report of the Chief of the Weather Bureau, beginning 1916–17, contains a section giving descriptions of tornadoes in each State during the year.

Numerous descriptions of individual tornadoes are scattered through the files of the MONTHLY WEATHER REVIEW, published by the U. S. Weather Bureau.

Some of the more important of these are:

St. Louis tornado of May 27, 1896. 1896, Mar., **24**: 77–81.

Omaha tornado of March 23, 1913. 1913, Mar., **41**: 396–397; 481–483.

Tornadoes in Kansas. (Summary.) 1915, Dec., **43**: 615–617.

Characteristics of tornadoes. 1899, Jan., **27**: 157.

Wind force in tornadoes. 1901, Sept., **29**: 419.

Tornadoes in eastern Nebraska. April 6, 1919. 1919. Apr., **47**: 234–236.

Tornado at Fergus Falls, Minn., June 22, 1919. 1919, June, **47**: 392–393.

Kansas tornadoes. 1919, July, **47**: 447–484.

Cyclones should not be confused with tornadoes. 1906, Jan., **34**:165.

Climatological Data for the United States by Sections also contains reports of tornadoes.—*C. F. Talman.*

THE HAILSTORM OF APRIL 8, 1920, IN WASHINGTON COUNTY, ALA.

About 5 p. m. on April 8, 1920, a severe hailstorm occurred in southwestern Washington County near Deer Park and Vinegar Bend, Ala. The storm came up with heavy and black clouds and moved from northwest to southeast, and was accompanied by heavy thunder, high winds, and heavy rainfall, amounting to about 2 inches (estimated). The hail fell over a strip about 3½ miles wide to an average depth of about 2½ inches, and drifted in places to a depth of 3 to 5 feet. The hailstones were about the size of a medium-sized hen's egg, egg-shaped and flat. Windows were broken, fruit was knocked off the trees, and leaves of trees, especially of the magnolia, were cut to shreds. The first hailstones that fell were snowy white; later the hailstones became clearer and more angular than when first observed. These details were kindly furnished by the postmaster at Deer Park, Ala.—*P. H. Smyth.*

CLOUDINESS IN NEW YORK STATE.

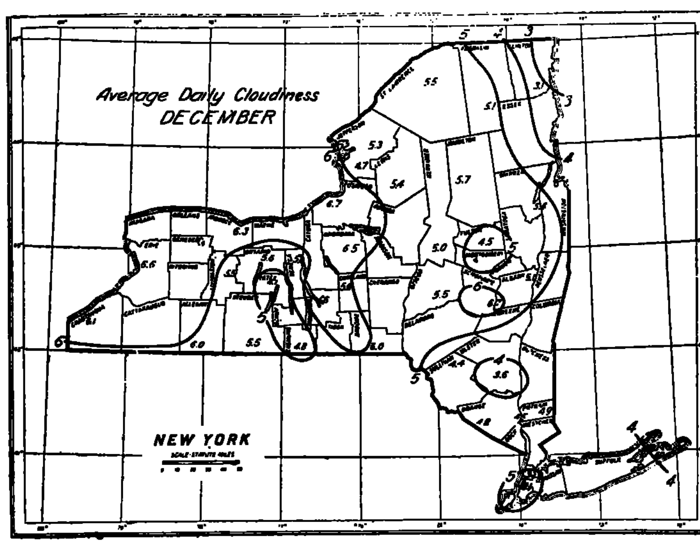
By ERNEST S. CLOWES.

[Bridgehampton, Long Island, N. Y., Apr. 14, 1920.]

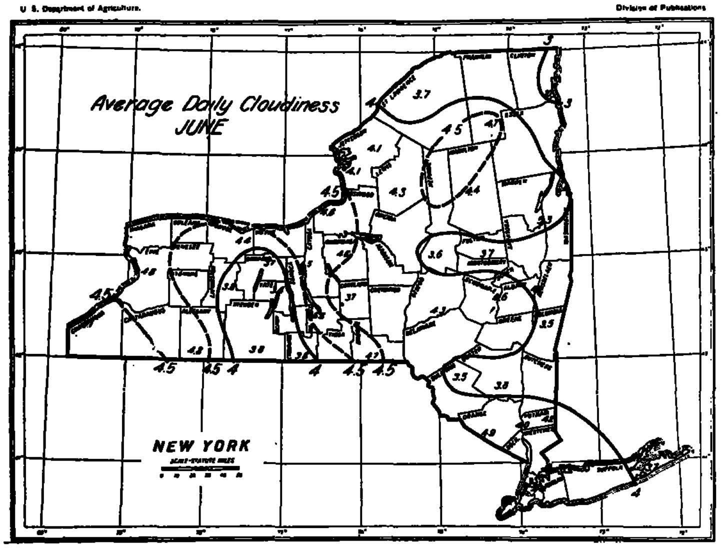
With the exception of North Carolina, the State of New York contains a greater range of temperature than any eastern State and it exceeds even North Carolina in the variety of its climatological features. With a seacoast of 250 miles and an approximately equal shore line on the Great Lakes, with elevations varying from sea level to 5,000 feet above, and lying, as it does, in the track of the great majority of storms that cross the American Continent, it offers an opportunity probably unequaled by any similar area in the world for a study of the varied phenomena of weather and climate. In this paper it is only intended to consider the distribution of cloudiness throughout the State as it is typically illustrative of lower cloud formation.

It has long been known that the leeward shores of the Great Lakes are one of the cloudiest regions of the United States, especially during the winter season; and further study goes to show that in all the lake region the cloudiest section is that along the eastern shores of Lake Erie and Lake Ontario where in addition to the situation of a leeward shore is added that of a marked elevation of the land area. At the same time it was recognized that other parts of New York were relatively sunny in winter, and so, in order to partly clear up this rather cloudy situation, this little study was undertaken while the author was at Syracuse, N. Y., in the service of the U. S. Weather Bureau and able to avail himself of the opportunities there offered.

The method employed was as follows: A number of stations, regular and cooperative, were selected with records of clear, partly cloudy, and cloudy days extending back for at least five years. From these records the months of December and June were selected to represent the maximum and minimum of cloudiness, although it is likely that July in some cases would have been nearer the minimum and November to the maximum. A five-year average was then made for each of these stations of the number of clear, partly cloudy, and cloudy days in each of these months. What was most wanted, however, was an expression of the average daily cloudiness. This was secured as follows: As the expression clear means a cloudiness of from 0 to 3 on a scale of 10; partly cloudy from 4 to 7, inclusive, and cloudy from 8 to 10; the average number of clear days was multiplied by 1½, of partly cloudy by 5, and of cloudy by 8½. The sum of the results was divided by 30, giving an expression for average daily cloudiness that was well within the limits of experimental error and which gave a fair basis for comparison. These figures were then inserted on their proper places on the map and lines of equal cloudiness drawn as shown. A contour map of the State with lines drawn at 500, 1,000, and 1,500 feet was also prepared.



Let us first look at the December map. The area of greatest cloudiness covers the entire western half of the State except for a "hump" of relatively clear skies from the southern boundary to the neighborhood of Rochester. Within this "hump" is an oval area covering the counties of Yates, Schuyler, and Chemung with an even less degree of cloudiness: 20 to 30 per cent less than in the section 50 miles to either side. This cloudy belt of western New York is, of course, explained by the prevailing northwest winds rising from the lakes to the high land of the interior which at this season is much colder than the water surface. The relatively clear spot in the west-central section can be explained by a glance at the contour map where it can be shown to coincide fairly well with a tongue of relatively low land running down from Lake Ontario and bounded on either side by land 500 to 1,000 feet higher. This is the region of the "Finger Lakes." The eastern half of the State, while on the whole much less cloudy than the western, shows maxima and minima clearly influenced by the



land elevation. For example, the clearest section is the west shore of Lake Champlain under the lee of the Adirondacks with an approach to it in Ulster County under the lee of the Catskills and the high plateau to the west; while the cloudiest spot in the eastern half of the State seems to be Schoharie County, at the end of a narrow trough of low land extending northwest to Lake Ontario through which moisture-laden winds may pass to be condensed there on the northern slopes of the Catskills. The relatively high cloudiness around New York City is probably local and due to city smoke and sea fogs or those arising from the harbor, which are at the maximum at about this time.

Turning to the June map we find much greater uniformity throughout the State, owing to the facts that the northwest winds from the lakes are more rare and that the land surface is warmer, but the minima over Lake Champlain and west-central New York still persist, although in not so pronounced a form. The influence of the mountains is still shown, and a new minimum has appeared in eastern Long Island. This last is probably due to causes mentioned in the author's earlier paper on the climate of this region published in Climatological Data for New York in 1917, viz, that this region is on the edge of the cloud belt resulting from St. Lawrence Valley storms, which are the prevalent summer type, and to the relative infrequency of thunderstorms, due to the proximity of the ocean and the trend of the coast which tends to keep the temperature low and uniform.

These maps show quite clearly the relation of wind, large water surfaces, and land elevation to cloudiness. Further study would probably show a correspondence with rainfall, and especially snowfall, as it is well known that the southeast shore of Lake Ontario is one of the snowiest regions of the United States.

AMATEURS RECEIVE FORECASTS BY WIRELESS TELEPHONE.

A letter from Mr. Eric R. Miller, of the Weather Bureau station at Madison, Wis., states that the Physics Department of the University of Wisconsin has for several months been sending out at 10 a. m. the weather forecast for Wisconsin. The wave length is 1,000 meters. Plans are under way to supply this information by wireless telephone. The apparatus is powerful enough for the messages to be audible to amateurs throughout the southern half of Wisconsin.

MODIFYING FACTORS IN EFFECTIVE TEMPERATURE; OR, A PRINCIPLE OF MODIFIED THERMAL INFLUENCE ON ORGANISMS.[1]

By ANDREW D. HOPKINS, Forest Entomologist in Charge of Forest Insect Investigations.

[Bureau of Entomology, United States Department of Agriculture.]

In connection with the writer's studies of the application of the bioclimatic law to the forecasting of the dates of events in the seasonal activities of insects, the optimum time to apply remedies for their control, other periodical farm practices, the latitude and altitude limits of distribution of organisms, etc., it has been found that the departures of the recorded variable from the computed constant dates of events are, in general, progressively earlier with higher latitude and altitude, or vice versa. It has also been found that certain regions of the United States are characterized by later departures, while the reverse is true of other regions.

According to the laws of temperature control of the seasonal activity of organisms, it has been assumed that a temperature above 45° to 50° F. is required to stimulate activity or that a given accumulation or sum of heat above the effective is required for the development of seasonal events.

It would seem, therefore, that an explanation of the regional departures might be found in the prevailing temperature, but an effort to apply this principle led to confusion rather than to an explanation of the causes of such variations.

It is natural to assume that acceleration of activity, represented by an early departure from the constant, would be associated with a relatively higher temperature, but when the mean temperatures of the regions of uniformly early or late departures were studied it was found that, as related to the major regions, progressively higher mean temperature with lower latitude and altitude was associated with progressively later departures, and vice versa.

It is plain, therefore, that, while temperature is an important factor of control, there are other factors that modify its effective influence which are related to latitude, longitude, and altitude. It seems (as indicated by the writer in SUPPLEMENT 9 of the MONTHLY WEATHER REVIEW, 1918) that the amount and character of daylight, sunshine, etc., exert an important modifying effect on life activities and that this effect is not reflected in the recorded temperature. It would appear, therefore, that it is in the variation of the effective influence of light, and evidently other elements of climate, with varia-

[1] Presented before American Meteorological Society, Washington, D. C., Apr. 22, 1920.